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SEVERAL PHENOTYPIC INDEXES OF GOATS OF LOCAL POPULATION AND ITS COMPLIANCE WITH STANDARDS OF SELECTION

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Abstract

The studied goat herd of local population is characterized by high heterogeneity of hair color and other genetically determined quality attributes, which is typical for unimproved local breeds and goat populations. Goats at the age of 3 years and more had average live weight of 47.94 kg with low coefficient of variation of the index. Evaluation of goats' compliance with the standard requirements for their distribution by categories in relation to the live weight has shown that 138 animals, or 75% of the female livestock, meet the requirements for the first category of local goat population, 129 of them are aged 3 and older, and 9 goats are under the age of 2.5 years. Average live weight of goats in selection groups was 50.24±0.39 kg and 41.33±1.5 kg respectively.

Key words: local goats, phenotype, evaluation, standard, selection

Introduction

Bio-economic importance of the goat species is due to its higher production potential, constitutional resistance of goats, their adaptability to various conditions of maintenance and exploitation (Novopashina et. al., 2010; Pascal, 2007; Taftă, 2008; Zabelina, 2009). These are complemented by the outstanding biological qualities (of taste and dietary ones) of the goat milk and meat (Taftă, 1996).

It is known that in many countries around the globe, in particular from the European subcontinent, specialized breeds of goats for milk production (Alpine, Saanen, Alpine Swiss French, German Noble White, Murciano, etc) are raised and exploited, which together with their high production potential require appropriate technological and nutritional conditions. This in turn requires investment in construction and machinery, in forage storage base, and in nutritional supplements (Pădeanu, 2002; Simonov, et.al., 2012).

At the same time, the biological material with a superior genetics from respective breeds already imported in the country (Mashner, O. Personal communication, 2010) is costly for farmers, which restricts the import of large batches and requires effective solutions for rational use of genetic mate-

rial, especially of reproducers (Mashner, O. Personal communication, 2010).

With regard to the situation of raising the local population of goats in the Republic of Moldova, it is found that this branch was offered a higher emphasis from the part of producers, since the 1990s (Mogoreanu, et.al., 1998). The main cause was the changes that took place with the transition to a market economy, restructuring the respective livestock sector (Bucătaru, et.al., 2003; Mogoreanu, et.al., 1998). In more than two decades the goat population in the country has increased more than two times, currently numbering about 130 thousand heads.

With the increase of the herd of goats in the country, the creation of flocks (farms) separated from sheep to produce goat milk and cheese is observed. At the same time, producers are asking for solutions to enhance the goat milk production in local goat herds through selection and breeding with the use of genetic material (billy-goats) of specialized breeds (Mashner, O. Personal communication, 2010).

In this context, the accumulation of information about the level of production of goats from the local population, the specifics of exterior and the level of existing variability is a

must for creating nuclei of selection and subsequent improvement actions within herds (farms) of local goats (Bucătaru, et.al., 2003; Mogoreanu, et.al., 1998). Obviously such information shall be compiled also for the purpose of subsequent crossings with the exported improvement breeding material (Mashner, O. Personal communication, 2010).

Material and Methods

The studies were carried out on a herd of goats from the local population, based in a specialized farm for milk production, located in southern Moldova (GAGAUZIA). The overall researched population was of 253 heads, including 168 heads of nanny-goats, 2 producer goats and 53 heads of young female goats aged up to one year.

The aim of the investigation was to characterize the flock of goats based on age structure, some quantitative characteristics and to determine the degree of compliance of the herd for the selection of animals in two categories, according to the instruction of appraisal (qualification) of goats for milk with the selection elements (Mashner, O. et.al., 2013).

The age of the goats was determined according to the dentition, in accordance with the generally accepted method in animal husbandry. Body weight of the goats was evaluated through measurement of individual animals with a precision of 0.1 kg. The particularities of the exterior were investigated using the somato-scopie and somato-metric methods, based on five adult nanny-goats of the predominant colors in the flock. Goat prolificacy in the farm was determined according to the birth register (%).

Recent variational series were processed in accordance with statistical methods, after Plohinschii (1969).

Results and Discussion

For determination of the age structure of goats from the surveyed farm, an individual examination has been carried

out using dentition method. On the basis of dental formula and modification of this age with the goats, it was established that the herd has an optimal structure, characterizing its specialization in dairy production. Lactating goats – 72%, youth female for breeding – 20.9% (Table 1).

At the same time, there was observed a very low share of re-producer billy-goats in the herd and total absence of replacement billy-goats. This gives evidence of avoidance of any extra costs for the upkeep of unproductive herd. Regarding the structure of the nanny-goats, it was established that the share of those aged 3 years old and over is high, accounting for 66.4 %, while of those between the ages of 1-1.5 years (lactation I) only 5.5%. The number of female youth for future reproduction was found to be satisfactory (53 heads or 20.9 %) to perform replacement of about 20% of the flock next year to the ones which will be scrapped after age and other causes of withdrawals.

An important consideration in the evaluation of local herds of goats is the qualitative indexes (Bucătaru et al., 2003; Mogoreanu et al., 1998), with reference to predominant colors of the sheath of the follicle, the presence or absence of horns and earrings (Table 2).

According to the data obtained, it is observed that there are goats in the flock with various colors of skin follicle (hair) – white, brown or black, brown, beige, gray and pied. In the group of the goats aged 3 years old and over (the largest group) most present colors in descending order are 4: beige (38) black (37), white (35) and brown (32). After these follow pied colored goats (16) and ginger ones - only four heads. From the goats aged 1-1.5 years more numerous are those beige-haired (6 of 14). Color study of evaluated goats in the flock can find that most are homozygous goats on this characteristic.

Regarding the analysis of the presence or absence of horns and earrings, there was established that most of the goats are with horns in all color of the follicle groups, with the exception of ginger sheep, which are 100% without

Table 1
The age structure of the flock of goats

Group	Total, head/%	Age of goats according to dentition, years							
		up to 1 year		1-1.5 years		1.5 -2 years		3 and more years	
		head	%	head	%	head	%	head	%
Peproducer Billy-goats	2/0	-	-	-	-	-	-	2	0.8
Nanny-goats	182/72.0	-	-	-	-	14	5.5	168	66.4
Female youth for breeding	53/20.9	53	20.9	-	-	-	-	-	-
Male youth for slaughter	16/6.3	16	6.3	-	-	-	-	-	-
Total herd	253/100	53	20.9	-	-	14	5.5	168	66.4

Table 2
Goats' features researched after some qualitative indices

The colors of colors of sheath of the follicle	Specification	Age of goats			
		head	1.5 -2 years, %	head	3 yrs and older, %
White	horns	1	100	35	68.5
	earrings		100		28.5
Black	horns	1	0	37	56.7
	earrings		0		18.9
Brown	horns	1	0	32	65.6
	earrings		0		31.2
Beige	horns	6	71.4	38	63.1
	earrings		0		23.6
Pied	horns	2	50	16	50.0
	earrings		50		12.5
Gray	horns	1	0	8	50.0
	earrings		0		12.5
Ginger	horns	2	0	4	0
	earrings		0		25.0

horns. Regarding the presence of earrings, for the beige and white colored goats this feature is manifested at 22.8-31.2% of the livestock.

Therefore, it can be inferred that the results of the research of the qualitative characteristics will be useful at the next stage, when it will move to the study of individual milk production and selection after this feature, with consideration of its possible correlations with the qualitative indices of goats.

Based on birth registration there was conducted an analysis of prolificacy of goats at the farm (Table 3). According to the presented data, from 180 nanny-goats that gave birth, there were obtained 247 kids. The average prolificacy of the herd of nanny-goats that gave birth was 137%.

Through analyzing goat prolificacy in relation to age at calving, it was determined that from 52 first birth nanny-goats there were obtained 70 kids, so prolificacy is 135%, which is specific to nanny-goats at first calving. In terms of this index, the prolificacy of adult nanny-goats aged 3 years

Table 3
Nanny-goat prolificacy of the studied flock

No. of nanny-goats that gave birth and their age	Heads	No. of kids obtained, heads	Prolificacy, %
1.5-2 years	52	70	135.0
3 years and more	128	177	138.0
Total herd	180	247	137.0

and older is relatively low (138%), which allows us to observe the need for an analysis of the causes of decreased prolificacy, with regard, to preparing the nanny-goats and producer billy-goats for the reproductive season.

The objective of the evaluation of the specifics of goats' exterior, outside of qualitative indices study, was achieved by conducting body measurements (Table 4) and calculation of the main indices of the exterior (Table 5) in adult goats of the four representative colors.

According to the values of the body measurements, it was confirmed that animals' torso is of medium size, with the waist of 64-68 cm depending on the color of the goat. Oblique torso length is framed in between 69 and 72 cm, which is a specific for the milk animals (morph-productive type). By examining the dimensions of the chest of the goats taken into study, it was observed that it is sufficiently deep and narrow. Depth of chest of measured goats ranged in average values of around 34 cm, and the width of the chest after blade was framed within the limits of 24-26 cm depending on the colors. So, it can be mentioned that the thorax is sufficiently developed with an average perimeter between 92 and 96 cm depending on the color of the measured goats. Regarding the development of the lower leg bone structure, represented by the perimeter of the tibia, it can be stated that it is well developed. The values of these body measurements are well below 9 cm, regardless of hair color of the goats.

Corporal indices, calculated for the researched goats showed that the body is composed proportionally with a ro-

Table 4
Body measurements of goats researched depending on the color, (M±m, cm)

Measurements	The colors of follicle			
	White (e) (n = 5)	Beige (n = 5)	Black (n = 5)	Brown (n = 5)
The height at the withers	68.4 ± 0.68	65.4 ± 1.24	65.0 ± 1.37	64.0 ± 0.63
Height at shoulder	70.2 ± 0.86	68.0 ± 1.58	68.2 ± 1.35	67.0 ± 0.70
Length of torso	72.6 ± 1.28	71.8 ± 1.49	72.6 ± 2.06	69.4 ± 0.74
Depth of chest	34.0 ± 0.44	34.0 ± 0.89	33.2 ± 0.86	34.2 ± 0.37
Chest width	26.0 ± 1.00	24.6 ± 0.60	24.2 ± 0.86	24.4 ± 0.24
The perimeter of the thorax	96.6 ± 0.92	95.0 ± 2.07	92.6 ± 2.29	94.6 ± 1.43
Perimeter of the tibia	8.7 ± 0.12	8.7 ± 0.12	9.0 ± 0.27	8.7 ± 0.12

bust aspect of morph-productive dolicomorph type. This is shown in the data presented in Table 5.

According to corporal indices values, it becomes apparent that whatever the color, the goats in the farm represent the same conformation as appearance. The values of differences of averages within certain indices are not statistically reliable. All this also proves that the researched flock is relatively uniform in terms of animal body conformation.

For establishing individual body development of the herd of breeding goats at the farm, in autumn period they were weighted. Data obtained on the body weight is shown in Table 6.

According to the results of statistical processing of the individual values of live weight of goats in the different age groups, we have determined that the body weight of the two billy-goats is 60 kg, which is caused by a relatively low state of fattening. Perhaps this was due to their excessive holding

in freedom, without being separated from the flock of females during the night and without receiving the required supplement of food concentrate.

With regard to the body weight of nanny-goats, it was found that they possess decent development characteristics. Thus the average body weight of young female goats is 37.92±0.85 kg with a quite low coefficient of variation – 8.1%. A proper body development we can reliably attribute to the adult nanny-goats. The average value of this characteristic constitutes 47.94±0.41 kg with coefficient of variation of 11.3%.

Therefore, it can be stated that the farm's goats possess good indices of corporal development, and the coefficient of variation in both groups of animals expresses appropriate homogeneity of goats and the undertaking by the owner of certain actions with a view to the selection of animals for reproduction of subsequent generations.

Table 5
Corporal Indices of investigated goats (M ± m,%)

Specification	n	The format of the body	Thoracic	Robustness	Bone structure
White	5	106.18 ± 2.18	76.60 ± 3.65	133.15 ± 1.61	12.71 ± 0.17
Beige	5	109.85 ± 2.16	72.39 ± 1.05	132.33 ± 1.59	13.32 ± 0.32
Black	5	111.83 ± 3.50	72.87 ± 1.55	127.76 ± 3.29	13.88 ± 0.59
Brown	5	108.44 ± 0.79	71.36 ± 0.86	136.31 ± 1.59	13.59 ± 0.23

Table 6
Body weight of researched goats researched, kg

Sex and age group	n	M ± m	Cv%
Breeder billy goats	2	60.00	-
Young female goats, aged 1.5-2 years	13	37.92 ± 0.85	8.1
Nanny-goats aged 3 years and more	169	47.94 ± 0.41	11.3

Table 7
Distribution of researched female goats in the categories for forming a selection nucleus

Specification	Requirements of the standard for body weight, kg		Correspond to the category			
	category	category	I		(II)	
	I	(II)	heads	%	heads	%
Female goats aged up to 3 years	38-40	35-38	9	64.2	5	35.8
The average body weight of female goats (M±m)	-	-	41.3±1.5	-	36.0±0.6	-
Female goats aged 3 years and more	45 and more	40-44	129	83.2	26	16.8
The average body weight of goats (M+m)	-	-	50.2± 0.4	-	42.3±0.2	-

Based on the results of the provisional testing of female goats, there was created the nucleus of selection, including the goats aged for up to three years and those aged 3 years and older, regardless of the color of skin follicle. The selection methodology was based on the allocation of the goats according to body development in relation to the minimum requirements of the standard (class I), which are proposed for the appraisal (qualification) of local population of goats (Table 7).

As a result of selection of researched female goats for forming a nuclei, in accordance with the methodology proposed for the allocation of goats from the local population into two categories comprising several criteria, including body weight. The following were proved (Table 7): from the group of female goats aged up to three years to the category I corresponded 9 heads, the other five being assigned to category II. The average body weight of goats included in the selected category I was 41.33±1.55 kg and those included in class II only 36.00 ± 0.57 kg. As for the allocation of female goats aged more than 3 years, it was found that the requirements for category I and for core selection nuclei, 129 nanny-goats have qualified, whose average body weight constitutes 50.24±0.39 kg. To the category II were assigned only 26 heads with average weight of 42.34±0.17 kg. The selection nucleus within the farm of researched goats is composed of 138 heads attributed, according to their bodyweight, to category I.

Conclusions

Goats from the local population are characterized by a high heterogeneity of the coating color follicle and other qualitative characteristics having a specific body development of unimproved goats. The average body weight of females aged 3 years and over constitutes 47.94 kg, although it has a relatively small variation of body weight.

The share of females in the herd, particularly lactating goats - 72%, demonstrates the farm specialization of production of milk from goats.

The proposed methodology for assigning local goat selection according to core categories, has established the nucleus of selection with an effective total of 138 female heads, including 129 nanny-goats older than 3 years old and young female goats – 9, after the first lactation. The average body weight of the goats constituted 50.24±0.39 and 41.33±1.5 kg respectively for the selected groups.

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